

ATTACHMENT D

Engineering Evaluation for Authority to Construct

AUTHORITY TO CONSTRUCT ENGINEERING EVALUATION

Application No.: A/C 21097
Date: September 18, 2008
Evaluation by: Bruce Nixon

A. FACILITY NAME:

Kiefer Landfill
Department of Waste Management and Recycling
County of Sacramento

B. LOCATION OF EQUIPMENT:

12701 Kiefer Blvd.
Sloughhouse

C. PROPOSAL:

Kiefer Landfill is proposing to install a second landfill gas (LFG) flare as part of the Landfill Gas Air Pollution Control System (will be 5 IC Engines and 2 Landfill Gas Flares).

D. DISCUSSION:

The Kiefer Landfill is required to collect and destroy the LFG produced by waste material decomposing within the landfill. The following federal regulations are the basis for the requirement:

- New Source Performance Standard - Subpart WWW - Municipal Solid Waste Landfills [40 CFR 60 (begin at 60.750)].
- National Emission Standard for Hazardous Air Pollutants - Subpart AAAA - Municipal Solid Waste Landfills [40 CFR 63 (begin at 63.1930)].

Kiefer Landfill has currently complied with the LFG destruction requirements by operating 1 LFG flare and 5 IC engines. The 6 devices operate as a LFG Air Pollution Control System with emission limits applicable to the combined emissions from all 6 devices.

The purpose of the new LFG Flare No. 2 is to:

- Serve as a backup device for reducing landfill gas emissions, together with LFG Flare No. 1, if circumstances force the shutdown of one or more of the 5 IC engines that normally are used to reduce landfill gas emissions. The 5 IC engines have a combined LFG destruction capacity of approximately 5,500 ft³/min of LFG. The existing LFG Flare No. 1 has a LFG destruction capacity of 5,000 ft³/min of LFG which is less than the capacity needed to destroy the current amount of LFG gas produced at Kiefer Landfill. In order to insure continuous compliance with

the federal NSPS and NESHAP regulations for Municipal Solid Waste Landfills, additional capacity to destroy the LFG is needed to supplement the capacity of LFG Flare No. 1, if one or more of the 5 IC engines do not operate.

- Prepare for future increased LFG capacity as the amount of municipal waste disposed of at the Kiefer Landfill site increases and produces more landfill gas. Although growth in the production of LFG is anticipated in the future, Kiefer Landfill is not proposing any increase in the current maximum emission levels associated with the Landfill Gas Air Pollution Control System at this time, but may in the future.

E. EQUIPMENT DESCRIPTION:

LFG Flare No. 2:

A/C No. 21097
Make: John Zink, Perennial Energy or equivalent
Model: Not available at this time
Type: Enclosed
Heat Input: 120 MMBTU/hour (at 500 BTU/ft³ of landfill gas)
Capacity: 4,000 ft³/min LFG

F. PROCESS RATE:

The proposed LFG Flare No. 2 can combust approximately 4,000 ft³/minute of LFG.

G. OPERATING SCHEDULE:

The proposed LFG Flare No. 2 can operate 24 hours/day and 365 days/year.

H. CONTROL EQUIPMENT EVALUATION:

ROC: The proposed LFG Flare No. 2 is expected to comply with the federal NSPS Subpart WWW and federal NESHAP Subpart AAAA regulations that specify a 98% NMOC destruction efficiency or a NMOC emission limit of 20 ppmvd at 3% O₂ as hexane.

NO_x: The proposed LFG Flare No. 2 will have a NO_x emission rate limitation of 0.05 lb/MMBTU. See BACT section of this evaluation for additional discussion.

SO₂: The proposed LFG Flare No. 2 will have a SO₂ emission rate limitation of 0.04 lb/MMBTU. See BACT section of this evaluation for additional discussion.

PM₁₀: The proposed LFG Flare No. 2 will have a PM₁₀ emission rate limitation of 0.0147 lb/MMBTU. See BACT section of this evaluation for additional discussion.

CO: The proposed LFG Flare No. 2 will have a CO emission rate limitation of 0.15 lb/MMBTU.

I. EMISSIONS CALCULATIONS:

1. HISTORIC POTENTIAL TO EMIT:

For purposes of determining BACT requirements -
the proposed LFG Flare No. 2 is a new emissions unit and therefore:

Historic Potential to Emit = 0

For purposes of determining emission offset requirements -
the proposed LFG Flare No. 2 will be included in the existing LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare). The LFG Air Pollution Control System is currently composed of 6 devices but will be composed of 7 devices with the addition of the proposed LFG Flare No. 2. The purpose of all of the devices included in the LFG Air Pollution Control System is to destroy LFG emissions from the Kiefer Landfill to comply with the NMOC limitation of the federal NSPS and NESHAP regulations.

The Historic Potential to Emit for a non-major modification to the LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare) is equal to the potential to emit prior to the modification (see SMAQMD Rule 202 Section 219.2). This is a non-major modification because there is no proposed increase in allowable emissions from the LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare).

LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare)

Pollutant	Maximum Allowable Emissions				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Annual tons/year
ROC	30,847	31,190	31,511	31,511	62.5
NOx	43,151	43,631	44,110	44,110	87.5
SO2	44,698	45,195	45,715	45,715	90.7
PM10	13,350	13,501	13,648	13,648	27.1
CO	219,798	222,258	224,715	224,715	445.7

2. PROPOSED POTENTIAL TO EMIT:

For purposes of determining BACT requirements -
the proposed Potential to Emit, for LFG Flare No. 2, by itself, is -

A/C 21097 Landfill Gas Flare No. 2

Pollutant	Emission Factor lb/MMft ³ of LFG	Maximum Allowable Emissions (F)				
		Daily lb/day	Quarter 1 (90 days) lb/quarter	Quarter 2 (91 days) lb/quarter	Quarter 3 (92 days) lb/quarter	Quarter 4 (92 days) lb/quarter
ROC	13.7 (A)	79	7102	7181	7260	7260
NOx	25 (B)	144	12960	13104	13248	13248
SO ₂	20 (C)	115	10368	10483	10598	10598
PM ₁₀	7.35 (D)	42	3810	3853	3895	3895
CO	75 (E)	432	38880	39312	39744	39744

(A) Emission factor for ROC is based on -

- i. a landfill gas NMOC concentration of 7,857 ppmv (as hexane),
[established from highest concentration of 17 co-disposal sites, average is 1,849.8 ppm,
Reference: Table 3-5, *Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines*, Office of Air Quality Planning and Standards, Research Triangle Park, U.S. Environmental Protection Agency, EPA-450/3-90-011a, March 1991]
- ii. 39% of total NMOC is ROC,
- iii. MW of NMOC (as hexane) is 86.18 and
- iv. 98% destruction efficiency.

(B) Emission factor for NO_x is based on permittee's request of 0.05 lb/MMBTU (equivalent to 25 lb/MMBTU at 500 BTU/ft³).

(C) Emission factor for SO₂ is based on a SMAQMD BACT determination of 0.04 lb/MMBTU (equivalent to 20 lb/MMBTU at 500 BTU/ft³).

(D) Emission factor for PM₁₀ is based on a SMAQMD BACT determination of 0.0147 lb/MMBTU (equivalent to 7.35 lb/MMBTU at 500 BTU/ft³).

(E) Emission factor for CO is based on permittee's request of 0.15 lb/MMBTU (equivalent to 75 lb/MMBTU at 500 BTU/ft³).

(F) Mass emissions are based on 4,000 ft³/minute LFG combustion rate, 500 BTU/ft³ of LFG, 24 hours/day and the number of days in each calendar quarter.

For purposes of determining emission offset requirements -

The proposed LFG Flare No. 2 will be included in the LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare). The LFG Air Pollution Control System is currently composed of 6 devices but will be composed of 7 devices with the addition of the proposed LFG Flare No. 2. The purpose of all of the devices included in the LFG Air Pollution Control System is to destroy LFG emissions from the Kiefer Landfill to comply with the NMOC limitation of the federal NSPS and NESHAP regulations.

The Potential to Emit of the modified LFG Air Pollution Control System (5 IC engines and 2 LFG flares and) is -

Pollutant	Maximum Allowable Emissions				
	Quarter 1 lb/quarter	Quarter 2 lb/quarter	Quarter 3 lb/quarter	Quarter 4 lb/quarter	Annual tons/year
ROC	30,847	31,190	31,511	31,511	62.5
NOx	43,151	43,631	44,110	44,110	87.5
SO2	44,698	45,195	45,715	45,715	90.7
PM10	13,350	13,501	13,648	13,648	27.1
CO	219,798	222,258	224,715	224,715	445.7

3. CALCULATION OF BACT TRIGGER:

NEI (BACT) = Net Emissions Increase for BACT purposes
= Proposed Potential to Emit - Historic Potential to Emit
MPE = Maximum Potential Emissions based on a 24-hour day operation

A/C 21097 Landfill Gas Flare No. 2

Pollutant	NEI (BACT) lb/qtr	Is NEI (BACT) >0 ?	MPE lb/day	BACT Trigger lb/day	Is BACT Required?
ROC (A)	-355,740	No	79	>10	No
NOx	13248	Yes	144	>10	Yes
SO2	10598	Yes	115	>10	Yes
PM10	3895	Yes	42	>10	Yes
CO	39744	Yes	432	>550	No

(A) LFG Flare No. 2 is used to control the emissions of ROC from the landfill. The destruction efficiency is assumed to be 98% based on source test data. LFG Flare No. 2 therefore reduces the amount of ROC emissions from the landfill by -

ROC emission
reduction = uncontrolled ROC emission - controlled ROC emission
= (7260 lb ROC/quarter / (1- 0.98)) - 7260 lb ROC/quarter
= 355,740 lb ROC/quarter

4. CALCULATION OF OFFSET TRIGGER FOR ROC AND NOx:

Indicates active permit

Permit No.	Emissions Unit	Stationary Source Potential to Emit lb/quarter	
		ROC	NOx
P/O 12320	Landfill and Landfill Gas Collection System	Modified to A/C 17821	
A/C 12321	Landfill Gas Flare	Modified to A/C 14669	
P/O 13574	IC Engine No. 1	Modified to A/C 16463	
P/O 13575	IC Engine No. 2	Modified to A/C 16519	
P/O 13576	IC Engine No. 3	Modified to A/C 16520	
A/C 14669	Landfill Gas Flare	Modified to A/C 15333	
A/C 15333	Landfill Gas Flare	Modified to A/C 16062	
P/O 16026	Gasoline Dispensing Facility	46	0
A/C 16062	Landfill Gas Flare	Modified to A/C 17058	
P/O 16150	IC Engine No. 4	Modified to A/C 19705	
P/O 16151	IC Engine No. 5	Modified to A/C 20801	
P/O 16463	IC Engine No. 1	Modified to A/C 17331	
P/O 16519	IC Engine No. 2	Modified to A/C 17332	
P/O 16520	IC Engine No. 3	Modified to A/C 17333	
P/O 17058	Landfill Gas Flare	Modified to A/C 17359	
P/O 17331	IC Engine No. 1	Modified to A/C 20797	
P/O 17332	IC Engine No. 2	Modified to A/C 20798	
P/O 17333	IC Engine No. 3	Modified to A/C 20799	
P/O 17359	Landfill gas flare	Modified to A/C 19704	
P/O 17677	IC Engine No. 1	Modified to A/C 17822	
P/O 17678	IC Engine No. 2	Modified to A/C 17823	
P/O 17679	IC Engine No. 3	Modified to A/C 17824	
P/O 17728	Landfill Gas Flare	Modified to A/C 17359	
P/O 17821	Landfill and Landfill Gas Collection System	205,344 (A)	0

Permit No.	Emissions Unit	Stationary Source Potential to Emit lb/quarter	
		ROC	NOx
P/O 17822	IC Engine No. 1	Modified to A/C 17331	
P/O 17823	IC Engine No. 2	Modified to A/C 17332	
P/O 17824	IC Engine No. 3	Modified to A/C 17333	
P/O 17921	IC Engine (TS)	Modified to A/C 19189	
P/O 17976	Trommel Screen	Modified to A/C 19188	
P/O 18184	IC Engine (G)	37	4,377
P/O 18185	Green Waste Grinder	0	0
P/O 19188	Trommel Screen	0	0
P/O 19189	IC Engine (TS)	Modified to A/C 19349	
P/O 19349	IC Engine (TS)	Modified to A/C 21262	
P/O 19363	IC Engine Auxiliary on Street Sweeper	39	452
P/O 19704	Landfill Gas Flare No. 1 [The total emissions from the 5 IC engines and the 2 LFG flares are shown here as emissions from the Landfill Gas Air Pollution Control System]	31,511 (B)	44,110 (C)
P/O 19705	IC Engine No. 4	Modified to A/C 20800	
P/O 20797	IC Engine No. 1	See P/O 19704	
P/O 20798	IC Engine No. 2	See P/O 19704	
P/O 20799	IC Engine No. 3	See P/O 19704	
P/O 20800	IC Engine No. 4	See P/O 19704	
P/O 20801	IC Engine No. 5	See P/O 19704	
A/C 21097	Landfill Gas Flare No. 2	See P/O 19704	
A/C 21262	IC Engine (TS)	41	661
Total		237,018	49,600
Offset Trigger Level		> 5,000	> 5,000

(A) ROC emissions are based on a NMOC concentration of 7,857 ppmv as hexane (MW=86.17) in the landfill gas, 39% of the NMOC is ROC, 5,882 cfm fugitive landfill gas generated at the landfill, 15% of the generated landfill gas is not collected by the landfill gas collection system and becomes fugitive emissions (= 882 cfm).

- (B) The quarterly ROC emissions for the proposed Landfill Gas Air Pollution Control System (consisting of 5 IC engines and 2 LFG flares) do not exceed the maximum allowable emissions for the initially permitted Landfill Gas Air Pollution Control System (consisting of 3 IC engines and 1 LFG flare). See the Engineering Evaluation for the initially permitted Landfill Gas Air Pollution Control System (A/C Nos. 13574, 13575 and 13576) for a description of the ERCs provided at that time.
- (C) The quarterly NOx emissions for the proposed Landfill Gas Air Pollution Control System (consisting of 5 IC engines and 2 LFG flares) are less than the sum of the individual potentials to emit for each device. The quarterly NOx emissions are limited by the ERCs provided for the proposed Landfill Gas Air Pollution Control System. See the Engineering Evaluation for the first modification to the Landfill Gas Air Pollution Control System (A/C Nos. 16150, 16151, 17331, 17332 and 17333) for a description of the ERCs provided at that time, which are the same ERCs provided for this permit action.

5. CALCULATION OF OFFSET TRIGGER FOR SO2, PM10 AND CO:

Indicates active permit

Permit No.	Emissions Unit	Stationary Source Cumulative Emission Increase Since 01-01-77 lb/quarter		
		SO2	PM10	CO
P/O 12320	Landfill and Landfill Gas Collection System	Modified to A/C 17821		
A/C 12321	Landfill Gas Flare	Modified to A/C 14669		
P/O 13574	IC Engine No. 1	Modified to A/C 16463		
P/O 13575	IC Engine No. 2	Modified to A/C 16519		
P/O 13576	IC Engine No. 3	Modified to A/C 16520		
A/C 14669	Landfill Gas Flare	Modified to A/C 15333		
A/C 15333	Landfill Gas Flare	Modified to A/C 16062		
P/O 16026	Gasoline Dispensing Facility	0	0	0
A/C 16062	Landfill Gas Flare	Modified to A/C 17058		
P/O 16150	IC Engine No. 4	Modified to A/C 19705		
P/O 16151	IC Engine No. 5	Modified to A/C 20801		
P/O 16463	IC Engine No. 1	Modified to A/C 17331		
P/O 16519	IC Engine No. 2	Modified to A/C 17332		
P/O 16520	IC Engine No. 3	Modified to A/C 17333		
P/O 17058	Landfill Gas Flare	Modified to A/C 17359		

Permit No.	Emissions Unit	Stationary Source Cumulative Emission Increase Since 01-01-77 lb/quarter		
		SO2	PM10	CO
P/O 17331	IC Engine No. 1	Modified to A/C 20797		
P/O 17332	IC Engine No. 2	Modified to A/C 20798		
P/O 17333	IC Engine No. 3	Modified to A/C 20799		
P/O 17359	Landfill gas flare	Modified to A/C 19704		
P/O 17677	IC Engine No. 1	Modified to A/C 17822		
P/O 17678	IC Engine No. 2	Modified to A/C 17823		
P/O 17679	IC Engine No. 3	Modified to A/C 17824		
P/O 17728	Landfill Gas Flare	Modified to A/C 17359		
P/O 17821	Landfill and Landfill Gas Collection System	0	0	0
P/O 17822	IC Engine No. 1	Modified to A/C 17331		
P/O 17823	IC Engine No. 2	Modified to A/C 17332		
P/O 17824	IC Engine No. 3	Modified to A/C 17333		
P/O 17921	IC Engine (TS)	Modified to A/C 19189		
P/O 17976	Trommel Screen	Modified to A/C 19188		
P/O 18184	IC Engine (G)	122	67	636
P/O 18185	Green Waste Grinder	0	20	0
P/O 19188	Trommel Screen	0	334	0
P/O 19189	IC Engine (TS)	Modified to A/C 19349		
P/O 19349	IC Engine (TS)	Modified to A/C 21262		
P/O 19363	IC Engine Auxiliary on Street Sweeper	19	20	118
P/O 19704	Landfill Gas Flare No. 1 [The total emissions from the 5 IC engines and the 2 LFG flares are shown here as emissions from the Landfill Gas Air Pollution Control System]	45,715	13,648	224,715
P/O 19705	IC Engine No. 4	Modified to A/C 20800		

Permit No.	Emissions Unit	Stationary Source Cumulative Emission Increase Since 01-01-77 lb/quarter		
		SO2	PM10	CO
A/C 20797	IC Engine No. 1	See P/O 19704		
A/C 20798	IC Engine No. 2	See P/O 19704		
A/C 20799	IC Engine No. 3	See P/O 19704		
A/C 20800	IC Engine No. 4	See P/O 19704		
A/C 20801	IC Engine No. 5	See P/O 19704		
A/C 21097	Landfill Gas Flare No. 2	See P/O 19704		
A/C 21262	IC Engine (TS)	8	24	137
Total		45,864	14,113	225,606
Trigger Level		> 13,650	> 7,500	> 49,500

6. CALCULATION OF EMISSION OFFSETS FOR ROC AND NOx:

ROC: Emission offsets are triggered for ROC. There is no proposed quarterly change in the allowable ROC emissions due to the addition of LFG Flare No. 2 to the existing LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare). Therefore, the amount of offsets required is 0.

NOx: Emission offsets are triggered for NOx. There is no proposed quarterly change in the allowable NOx emissions due to the addition of LFG Flare No. 2 to the existing LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare). Therefore, the amount of additional offsets required, beyond those offsets previously required, is 0.

7. CALCULATION OF EMISSION OFFSETS FOR SO2, PM10 AND CO:

SO2: Emission offsets are triggered for SO2. There is no proposed quarterly change in the allowable SO2 emissions due to the addition of LFG Flare No. 2 to the existing LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare). Therefore, the amount of offsets required is 0.

PM10: Emission offsets are triggered for PM10. There is no proposed quarterly change in the allowable PM10 emissions due to the addition of LFG Flare No. 2 to the existing LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare). Therefore, the amount of additional offsets required, beyond those offsets previously required, is 0.

CO: Emission offsets are triggered for CO. There is no proposed quarterly change in the allowable CO emissions due to the addition of LFG Flare No. 2 to the existing LFG Air Pollution Control System (currently 5 IC engines and 1 LFG flare). Therefore, the amount of offsets required is 0.

J. COMPLIANCE WITH RULES AND REGULATIONS:

1. CALIFORNIA HEALTH AND SAFETY CODE SECTION 42301.6 COMPLIANCE:

The proposed equipment is not located within 1000 feet of a K-12 school, therefore California Health and Safety Code Section 42301.6 requirements for public noticing do not apply.

2. NSR COMPLIANCE:

SMAQMD Rule 202 - New Source Review

Section 112 - Exemption - Notification Requirements

This permit action will be processed using SMAQMD Rule 202 Section 404 *Enhanced New Source Review* and therefore the notification exemption of Section 112 is not applicable. The procedural requirements in SMAQMD Rule 207 Sections 401 through 408 will be used.

Section 301 - BACT

ROC: The requirement to apply BACT is not triggered for this modification because there is no quarterly increase in ROC emissions.

NOTE - the NSPS, 40 CFR 60 Subpart WWW, requires that the LFG flare control the collected landfill gas by either reducing the mass ROC by 98% or emitting less than 20 ppmv ROC (at 3% O₂ and measured as hexane). If a BACT determination was required to be made for the LFG flare, the ROC emission requirement would be no more restrictive than the NSPS.

NOx: BACT is required for the control of NOx emissions from LFG Flare No. 2 for the following reasons:

1. There is a quarterly increase in NOx emissions from LFG Flare No. 2.
2. The maximum daily NOx emission from LFG Flare No. 2 is greater than the BACT applicability level of 10 lb NOx/day.

SMAQMD BACT Determination Procedure for NOx

1. Review SMAQMD Stationary Source Database BACT section to determine if a BACT determination exists for the size and type of emissions unit under review.

Result of review: The SMAQMD made a BACT determination for a 150 MMBTU/hour LFG flare in May 2003. The NOx emission limit was set at 0.06 lb NOx/MMBTU.

2. Even though there is an existing SMAQMD BACT determination, it is over 5 years old and therefore a new top-down BACT analysis will be performed.

NOx Top-Down BACT Analysis

Step 1: Identify all NOx control technologies

Available Control Technologies	NOx limit	District/ Year Determined
44 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SBCAPCD/ 1998
35 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SCAQMD/ 2001
150 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SMAQMD/ 2003
36 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SJVAPCD/ 1995
Size not specified - Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	BAAQMD/ 1991

Step 2: Eliminate technologically infeasible options

A. None of the NOx control technologies are eliminated.

Available and Feasible NOx Control Technologies	NOx limit	District/Year Determined
44 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SBCAPCD/ 1998
35 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SCAQMD/ 2001
150 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SMAQMD/ 2003
24 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SJVAPCD/ 1995
Size not specified - Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	BAAQMD/ 1991

Step 3: Rank remaining control technologies by control effectiveness

Available NOx Control Technologies Ranked by Control Effectiveness	NOx limit	District/Year Determined
44 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SBCAPCD/ 1998
35 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SCAQMD/ 2001
150 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SMAQMD/ 2003
24 MMBTU/hour Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	SJVAPCD/ 1995
Size not specified - Landfill Gas Flare Flare burner design	0.06 lb/MMBTU	BAAQMD/ 1991

Step 4: Cost effectiveness analysis

Not necessary because the applicant is proposing a control technology with a higher control effectiveness (0.05 lb NOx/MMBTU) than existing BACT determinations.

Step 5: Select BACT

Selected NOx BACT	NOx BACT limit
Landfill Gas Flare Flare burner design	0.06 lb/MMBTU The permittee's proposed emission level of 0.05 lb/MMBTU is more restrictive than BACT.

SO2: BACT is required for the control of SO2 emissions from LFG Flare No. 2 for the following reasons:

1. There is a quarterly increase in SO2 emissions from LFG Flare No. 2.
2. The maximum daily SO2 emission from LFG Flare No. 2 is greater than the BACT applicability level of 10 lb/day.

SMAQMD BACT Determination Procedure

1. Review SMAQMD Stationary Source Database BACT section to determine if a BACT determination exists for the size and type of emissions unit under review.

Result of review: The SMAQMD has not made a BACT determination.

2. If there is no existing SMAQMD BACT determination then a new top-down BACT analysis will be performed.

SO2 Top-Down BACT Analysis

Step 1: Identify all control technologies

NOTE - the following SO2 limits are not based on control technology reducing SO2 emissions in the flare's exhaust gas, but are based on a maximum allowable sulfur content of the landfill gas combusted by the flare.

Available SO2 Control Technologies	SO2 limit	District/Year Determined
37.5 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas.	5.1 lb/MMscf of LFG (equivalent to 0.01 lb/MMBTU at 500 BTU/scf))	SCAQMD/ 2001
24 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas.	20 lb/MMscf of LFG (equivalent to 0.04 lb/MMBTU at 500 BTU/scf)	SJVUAPCD/ 1995
12 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas. (This was a RACT determination for Ox Mountain Landfill, Application No. 12649)	150 ppmv (as H2S) in the LFG (equivalent to 0.05 lb/MMBTU at 500 BTU/cf)	BAAQMD/ 2006
150 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas.	42.4 lb/MMscf of LFG (equivalent to 0.085 lb/MMBTU at 500 BTU/cf)	SMAQMD/ 2003

Step 2: Eliminate technologically infeasible options

- A. The SMAQMD, in this SO2 BACT determination, will set the maximum LFG sulfur content level such that compliance will be achieved without the addition of equipment to remove sulfur from the LFG or exhaust gas of the flare. It is universally accepted by California air districts that the cost of that type of control equipment is not cost effective.

The LFG sulfur content is dependent on the types of wastes that have been and will be disposed of in the landfill. The LFG sulfur level should be set at the maximum measured sulfur content plus an increment above that to account for

variability in the laboratory sulfur analysis procedure and variability in materials disposed of in the landfill that influence the sulfur content of the LFG.

The SCAQMD's 0.01 lb/MMBTU BACT determination is eliminated as technologically feasible from the table below because previous sulfur analysis of the landfill gas at the Kiefer Landfill (10-25-2006) resulted in a sulfur content equivalent to 0.01 lb SO₂/MMBTU (at 500 BTU/cf). This sulfur level allows no increment to be added to the measured sulfur levels at Kiefer Landfill.

Available SO ₂ Control Technologies	SO ₂ limit	District/Year Determined
24 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas.	20 lb/MMscf of LFG (equivalent to 0.04 lb/MMBTU at 500 BTU/scf)	SJVUAPCD/ 1995
12 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas. (This was a RACT determination for Ox Mountain Landfill, Application No. 12649)	150 ppmv (as H ₂ S) in the LFG (equivalent to 0.05 lb/MMBTU at 500 BTU/cf)	BAAQMD/ 2006
150 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas.	42.4 lb/MMscf of LFG (equivalent to 0.085 lb/MMBTU at 500 BTU/cf)	SMAQMD/ 2003

Step 3: Rank remaining control technologies by control effectiveness

Available SO ₂ Control Technologies Ranked by Control Effectiveness	PM ₁₀ limit	District/Year determined
24 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas.	20 lb/MMscf of LFG (equivalent to 0.04 lb/MMBTU at 500 BTU/scf)	SJVUAPCD/ 1995
12 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas. (This was a RACT determination for Ox Mountain Landfill, Application No. 12649)	150 ppmv (as H ₂ S) in the LFG (equivalent to 0.05 lb/MMBTU at 500 BTU/cf)	BAAQMD/ 2006

Available SO2 Control Technologies Ranked by Control Effectiveness	PM10 limit	District/ Year determined
150 MMBTU/hour Landfill Gas Flare Limit on sulfur content of landfill gas.	42.4 lb/MMscf of LFG (equivalent to 0.085 lb/MMBTU at 500 BTU/cf)	SMAQMD/ 2003

Step 4: Cost effectiveness analysis

Not necessary because the LFG sulfur levels are all achieved in practice.

Step 5: Select BACT

Selected SO2 BACT	SO2 BACT limit
LFG Flare Limit on sulfur content of landfill gas. NOTE - Kiefer Landfill is concerned that the type of materials deposited in the landfill in the future may, due to increased recycling mandates for construction waste, produce more SO2 emissions. A condition will be included in the permit that will recognize this possibility and outline a timeframe for Kiefer Landfill to apply for a permit modification.	20 lb/MMft3 of LFG (equivalent to 0.04 lb/MMBTU at 500 BTU/ft3) This emission level is approximately 113 ppmv S in the landfill gas (when measured as H2S which is the common practice since H2S is 80% or more of the total S). This emission level is also equivalent to approximately 7.4 grains S/100ft3 (when measured as H2S). (A)

(A) The equivalency is derived as follows -

- i. 20 lb SO2/MMft3 of LFG = 14 grains SO2/100 ft3 LFG.
- ii. There is 1 lb of S measured for every 2 lb of SO2 measured.
Therefore 20 lb SO2/MMft3 of LFG = 7 grains S/100 ft3 LFG.
- iii. There are 34 lb of H2S measured for every 32 lb of S measured.
Therefore 20 lb SO2/MMft3 of LFG = 7.4 grains H2S/100 ft3 LFG.

PM10: BACT is required for the control of PM10 emissions from LFG Flare No. 2 for the following reasons:

1. There is a quarterly increase in PM10 emissions from LFG Flare No. 2.
2. The maximum daily PM10 emission from LFG Flare No. 2 is 53 lb/day which is greater than the BACT applicability level of 10 lb/day.

SMAQMD BACT Determination Procedure

1. Review SMAQMD Stationary Source Database BACT section to determine if a BACT determination exists for the size and type of emissions unit under review.

Result of review: The SMAQMD made a BACT determination for a 150 MMBTU/hour LFG flare in May 2003. The PM10 emission limit was set at 7.35 lb PM10/MMscf LFG (equivalent to 0.0147 lb PM10/MMBTU at 500 BTU/scf).

2. Even though there is an existing SMAQMD BACT determination, it is 5 years old and therefore a new top-down BACT analysis will be performed.

Top-Down BACT Analysis

Step 1: Identify all control technologies

Available PM10 Control Technologies	PM10 limit	District/Year Determined
44 MMBTU/hour Landfill Gas Flare Fuel pretreatment consisting of: 1. condensate removal. 2. filtering of landfill gas particulates.	4.0 lb/MMscf of LFG (equivalent to 0.008 lb/MMBTU at 500 BTU/scf)	SBCAPCD/ 1998
35 MMBTU/hour Landfill Gas Flare Not specified	6.1 lb/MMscf of LFG (equivalent to 0.012 lb/MMBTU at 500 BTU/scf)	SCAQMD/ 2001
150 MMBTU/hour Landfill Gas Flare	7.35 lb/MMscf of LFG (equivalent to 0.0147 lb/MMBTU at 500 BTU/scf)	SMAQMD/ 2003
24 MMBTU/hour Landfill Gas Flare Air assist fan	50 lb/MMscf of LFG (equivalent to 0.1 lb/MMBTU at 500 BTU/scf)	SJVUAPCD/ 1995
Size not specified - Landfill Gas Flare Fuel pretreatment consisting of: 1. knockout vessel 2. fuel gas filter	None	BAAQMD/ 1991

Step 2: Eliminate technologically infeasible options

- A. The PM10 limit of 0.008 lb/MMBTU was eliminated because SBCAPCD has never verified compliance with the limit by source test (see Attachment A).
- B. The PM10 limit of 6.1 lb/MMscf of LFG was eliminated because the limit is applied to a flare with a capacity that is only 29% of the 120 MMBTU/hour capacity of the flare for which this BACT determination is being made. The SMAQMD does not believe that the BACT limit of the smaller Landfill Gas Flare can be applied to a Landfill Gas Flare four times larger.

Available and Feasible PM10 Control Technologies	PM10 limit	District/ Year determined
150 MMBTU/hour Landfill Gas Flare	7.35 lb/MMscf of LFG (equivalent to 0.0147 lb/MMBTU at 500 BTU/scf)	SMAQMD/ 2003
24 MMBTU/hour Landfill Gas Flare Air assist fan	50 lb/MMscf of LFG (equivalent to 0.1 lb/MMBTU at 500 BTU/scf)	SJVUAPCD/ 1995
Size not specified - Landfill Gas Flare Fuel pretreatment consisting of: 1. knockout vessel 2. fuel gas filter	None	BAAQMD/ 1991

Step 3: Rank remaining control technologies by control effectiveness

Available PM10 Control Technologies Ranked by Control Effectiveness	PM10 limit	District/ Year determined
150 MMBTU/hour Landfill Gas Flare	7.35 lb/MMscf of LFG (equivalent to 0.0147 lb/MMBTU at 500 BTU/scf)	Applicant's proposed permit limit

Available PM10 Control Technologies Ranked by Control Effectiveness	PM10 limit	District/ Year determined
24 MMBTU/hour Landfill Gas Flare Air assist fan	50 lb/MMscf of LFG (equivalent to 0.1 lb/MMBTU at 500 BTU/scf)	SJVUAPCD/ 1995
Size not specified - Landfill Gas Flare Fuel pretreatment consisting of: 1. knockout vessel 2. fuel gas filter	None	BAAQMD/ 1991

Step 4: Cost effectiveness analysis

Not necessary because the PM10 levels are all achieved in practice.

Step 5: Select BACT

Selected PM10 BACT	PM10 BACT limit
150 MMBTU/hour Landfill Gas Flare	7.35 lb/MMscf LFG (equivalent to 0.0147 lb/MMBTU)

The existing LFG Flare No. 1 at Kiefer Landfill is required to meet the 7.35 lb PM10/MMscf LFG (0.0147 lb PM10/MMBTU) and has demonstrated compliance through multiple source tests. The proposed LFG Flare No. 2 should be required to meet this same emission limitation.

Section 302 - Offsets

Offsets are triggered for ROC, NO_x, SO₂, PM10 and CO, but there are no quarterly increases in emissions from the modified Landfill Gas Air Pollution Control System (5 IC engines and 2 LFG flares) when compared to the existing Landfill Gas Air Pollution Control System (5 IC engines and 1 LFG flare). Therefore, no additional ERCs are required beyond those ERCs designated to be provided for the existing Landfill Gas Air Pollution Control System (5 IC engines and 1 LFG flare).

The following are the emissions for which ERCs are required to be provided for the existing Landfill Gas Air Pollution Control System (5 IC engines and 1 LFG flare). The same amount of ERCs will be required to be provided for the modified Landfill Gas Air Pollution Control System (5 IC engines and 2 LFG flares).

Landfill Gas Air Pollution Control System (5 IC engines and 2 LFG flares)	Amount of Emissions for which ERCs are to be Provided lb/quarter			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
NOx -for SMAQMD Rule 202 New Source Review purposes	20,484	20,711	20,938	20,938
NOx -for U.S. EPA Pollution Control Project purposes	87.5 tons/year			
PM10	5,799	5,909	6,016	6,016

Section 307 - Denial, Failure to Meet CEQA

The SMAQMD utilizes the Guide to Air Quality Assessment in Sacramento County, SMAQMD, July 2004 as a guide during the initial study phase of a proposed project to determine the level of review necessary under CEQA.

- ROG and NOx: Because the maximum allowable quarterly emissions will not increase due to the addition of a second flare to the Landfill Gas Air Pollution Control System (currently 1 flare and 5 IC engines), the average daily project emissions are 0 lb/day of NOx and 0 lb/day of ROG. These emission levels are below the CEQA review trigger levels of 65 lb/day.
- Other pollutants: The project does not result in operational emissions that could lead to violations of any applicable state Ambient Air Quality Standards.
- Toxic Air Contaminants (TACs): The project is not required to comply with T-BACT because the risk, associated with emissions from Landfill Gas Flare No. 2, does not exceed 1 in 1 million.
- Cumulative TACs: The project is not located near any sources identified in the CARB Toxics Hot Spot Program (AB2588) which result in a cumulative risk greater than 10 in one million.

The project does not exceed any of the criteria above, therefore the project does not require further CEQA review.

3. PSD COMPLIANCE:

PSD is not applicable because there is no increase in facility emissions associated with this permit action.

4. PROHIBITORY RULES COMPLIANCE

Rule 401 - Ringelmann Chart

Visible emissions from LFG Flare No. 2 are expected to comply with the 20% opacity requirement of this rule.

Rule 402 - Nuisance

When Landfill Gas Flare No. 1 was evaluated for Authority to Construct (A/C No. 12321) in 1996 a Health Risk Assessment was performed with the following results -

"The cancer risk associated with just the control system is approximately 0.004 in a million. The acute and chronic hazard indices associated with just the control system is approximately 0.007 each. Therefore, the majority of the risk is due to the emissions of gas emanating from the landfill naturally. A collection and control system will only reduce the risk. Therefore, this project is expected to be in compliance with this rule. "

Landfill Gas Flare No. 2 has a capacity that is 20% smaller than Landfill Gas Flare No. 1. The release height and temperature of the emissions is approximately the same. Therefore, the risk associated with Landfill Gas Flare No. 2 is expected to be even less than that from Landfill Gas Flare No. 1. The SMAQMD's maximum allowable cancer risk is 1 in 1 million and maximum acute and chronic hazard indices is 1.

The operation of Landfill Gas Flare No. 2 is expected to comply with this rule.

Rule 406 - Specific Contaminants

Emissions from LFG Flare No. 2 are expected to comply with the emissions limit of 0.2% by volume sulfur compounds as SO₂ and 0.1 grains/dscf of other combustion gases corrected to 12% CO₂.

Landfill Gas (LFG) F-factor = 9,743 ft³ EG (exhaust gas)/MMBTU (source test data)
LFG Heat Content = 426 BTU/ft³ LFG (source test data)
Outlet Oxygen = 13.2% (source test data)
Outlet Carbon Dioxide = 6.8% (source test data)
SO₂ Emission Factor = 20 lb SO₂/MMft³ LFG (measured as H₂S)
= 20 x (34 lb H₂S/32 lb S)
= 21.25 lb SO₂/MMft³ LFG (measured as S)
PM Emission Factor = 7.35 lb PM₁₀/MMft³ LFG

Molecular Weight of SO₂ = 64 grams/mole
Standard Molar Volume = 0.8493 dscf/mol (at 68 degrees F and 1 atm)

PM₁₀ concentration (combustion contaminants):

$$\begin{aligned} &= \frac{\text{Flare PM}_{10} \text{ mass emission rate (grains/min)}}{\text{Flare volumetric Exhaust Gas flow rate (ft}^3 \text{ EG/min)}} \\ &= \frac{(7.35 \text{ lb PM}_{10}/\text{MMft}^3 \text{ LFG}) (7000 \text{ grains/lb}) (4000 \text{ ft}^3 \text{ LFG/min})}{(4000 \text{ ft}^3 \text{ LFG/min}) (426 \text{ BTU/ft}^3 \text{ LFG}) (9743 \text{ ft}^3 \text{ EG/MMBTU})} \\ &= \frac{257 \text{ grains PM}_{10}/\text{min}}{20753 \text{ ft}^3 \text{ EG/min}} \text{ at 0\% O}_2 \text{ based on definition of Fd Factor} \end{aligned}$$

- = $\frac{257 \text{ grains PM10/min}}{56330 \text{ ft}^3 \text{ EG/min}}$ at 13.2% O2 actual test condition
- = 0.0046 grains PM10/ft³ EG at 6.8% CO2 actual test condition
- = 0.008 grains PM10/ft³ EG at 12% CO2

SO2 Concentration (%SO2 by volume):

- = $\frac{\text{Flare volumetric SO2 emission rate (ft}^3 \text{ SO2/min)}}{\text{Flare volumetric combustion gas emission rate (ft}^3 \text{ EG/min)}}$
- = $\frac{(21.25 \text{ lb SO2/MMft}^3 \text{ LFG}) (453.6 \text{ grams/lb}) (4000 \text{ ft}^3 \text{ LFG/min}) (0.8493 \text{ ft}^3/\text{g-mole}) (1 \text{ g-mole}/64 \text{ g})}{(4000 \text{ ft}^3 \text{ LFG/min}) (426 \text{ BTU/ft}^3 \text{ LFG}) (9743 \text{ ft}^3 \text{ EG/MMBTU})}$
- = $\frac{0.51 \text{ ft}^3 \text{ SO2/min}}{16602 \text{ ft}^3 \text{ EG/min}}$ at 0% O2 based on definition of Fd Factor
- = $\frac{0.51 \text{ ft}^3 \text{ SO2/min}}{45058 \text{ ft}^3 \text{ EG/min}}$ at 13.2% O2 actual test condition
- = 0.001% SO2 by volume

Rule 420 - Sulfur Content of Fuels

The permit condition limit of 20 lb of SO2 emitted per 1 MMft³ of landfill gas combusted equates to approximately 7.4 grains of sulfur compounds (measured as H2S) per 100 cubic feet of landfill gas fuel. This will comply with the rule limitation of 50 grains of sulfur compounds (measured as H2S) per 100 cubic feet of gaseous fuel.

5. NSPS COMPLIANCE:

The Landfill Gas Flare, acting as a control device for landfill gas emissions, is subject to 40 CFR Part 60 Subpart WWW - New Source Performance Standards for Municipal Solid Waste Landfills. Conditions will be placed on the Authority to Construct and Permit to Operate to insure compliance with the NSPS requirements.

6. NESHAP/ATCM COMPLIANCE:

The Landfill Gas Flare, acting as a control device for landfill gas emissions, is subject to 40 CFR 63 Subpart AAAA - National Emission Standards for Hazardous Air Pollutants for Municipal Solid Waste Landfills. Conditions will be placed on the Authority to Construct and Permit to Operate to insure compliance with the NESHAP requirements.

F. RECOMMENDATION:

1. **PRELIMINARY DECISION** - An Authority to Construct approving the installation of LFG Flare No. 2 should be issued to Kiefer Landfill with the following conditions.
2. **ENHANCED NEW SOURCE REVIEW PROCESSING** - Prepare a 30 day public notice and a 45 day U.S. EPA Region 9 notice of the preliminary decision to issue the Authority to Construct following the procedures in SMAQMD Rule 207 Sections 401 through 408.

3. After the close of the notice periods, consider all comments prior to finalizing the decision.

Refer to conditions on Authority to Construct No. 21097

Reviewed by: _____ Date: _____

ATTACHMENT A

Information Regarding SBCAPCD PM10 BACT Determination

Sacramento Metropolitan Air Quality Management District

Memo

April 07, 2003

To: Permit File: A/C App. No. 17058
Kiefer Landfill Gas Flare

From : Bruce Nixon

Subject: BACT follow up for Landfill Gas Flare in SBCAPCD

I emailed Peter Cante, Permit Manager for the SBCAPCD to follow up on a BACT determination in the CARB BACT Clearinghouse that SBCAPCD made in 1998 for a Landfill Gas Flare. I specifically asked if the Landfill Gas Flare had ever been source tested to verify compliance with the BACT PM10 limit of 0.008 lb PM10/MMBTU.

An email response (attached) was received from Al Ronyecz of the SBCAPCD who acted as the project manager for the SBCAPCD's permitting of the landfill. Al Ronyecz indicated that the Landfill Gas Flare had never been tested for emissions of PM10.

The SBCAPCD PM10 BACT determination is therefore unsubstantiated for use in the SMAQMD's top down PM10 BACT determination for the Kiefer Landfill Gas Flare.

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**Email Response from SBCAPCD Regarding
PM10 BACT Determination for Landfill Gas Flare**

From: Al X. Ronyecz [ronyecza@sbcapcd.org]
Sent: Tuesday, April 08, 2003 11:10 AM
To: BRUCE NIXON
Cc: Mike F. Goldman
Subject: Tajiguas Landfill Santa Barbara County Emission Factors

The information on the CARB BACT clearinghouse reflects an earlier configuration of the controls at Tajiguas Landfill which constituted an IC engine/afterburner (flare) combination. We are taking steps to correct the BACT information on the clearinghouse for this source. The flare control device has since been modified and the devices separated into two distinct controls. PM/PM10 emission factors for these devices that appear in PTO 9788 are as follows:

Flare = 0.008 lb/MMBTU

IC Engine = 0.066 grams/bhp-hr

The flare has never been tested for PM/PM10; the IC engine was tested in 2001 with an average PM test result of 0.063 grams/bhp-hr.

I hope this is helpful.

Al Ronyecz
Tajiguas Landfill Project Manager
Santa Barbara County APCD